LIMB ISCHEMIA AND FEMORAL ARTERIAL CANNULATION FOR EXTRACORPOREAL MEMBRANE OXYGENATION: DOES THE PERFECT TECHNIQUE EXIST?

To the Editor:

We read the very interesting report by Demertzis and Carrel[1] presenting a technique for the transformation of percutaneous femoral cannulation to chimney-graft cannulation for arterial access in extracorporeal membrane oxygenation (ECMO) support. They reported a series of 3 patients undergoing venoarterial ECMO who received percutaneous cannulation through femoral vessels and a switch to transprosthetic cannulation within the following 24 hours. After surgical preparation of the common femoral artery, an end-to-side anastomosis between the vascular prosthesis and the arterial vessel was performed proximally to the insertion of the ECMO cannula. A new cannula was then inserted into the prosthesis and the old cannulation site was repaired. No local complications and no distal ischemia were described.

According to our experience, the rate of ischemic complications after femoral cannulation was 21.4%,[2] although the literature shows a variation between 10% and 70%.[3] Peripheral arterial disease and a larger cannula size to body surface area ratio are the strongest predictors of vascular complications.[4] In order to prevent ischemic complications, a distal perfusion cannula is the most common solution. Otherwise, the chimney-graft technique is well established and is particularly recommended in patients with small vessels, when ischemia develops after direct arterial cannulation, or when the groin vessels are already exposed. Unfortunately, this approach is not suitable for emergencies. Demertzis and Carrel[5] previously described a technique whereby a presealed vascular prosthesis was placed over the cannula before direct cannulation and the vascular prosthesis was anastomosed to the artery after ECMO stabilization. In the latest report, the authors did not compare the complications or the outcomes of both techniques. It would be worth knowing about any cases of failure with the previous technique. Furthermore, the new technique requires more complex handling of the femoral vessel, which could lead to a higher risk of arterial dissection or laceration, thrombosis, embolization, arteriovenous fistula, kinking, and infections of the prosthesis. We wonder if the investigators checked the site of cannulation during cardiopulmonary bypass and after weaning from ECMO to note any local problems.

Moreover, the authors suggested elective transformation of percutaneous cannulation to transprosthetic cannulation to avoid problems related to stopcock connection resistance. On the other hand, total percutaneous cannulation could lower wound complications such as lymphocele, hematoma, and infections, especially in immunocompromised, vasculopathic, obese, or diabetic patients. Do the investigators have any suggestions about selecting patients suitable for the technique described?

Demertzis and Carrel[1] ought to be congratulated for the techniques they described. Such strategies should be considered as useful surgical approaches in patients requiring the switch from percutaneous cannulation to transprosthetic cannulation such as those with small arteries occluded by arterial cannulas, with ischemia after percutaneous cannulation, when distal perfusion catheterization is not feasible, or distal flow is inadequate. Our main concern about the experience presented deals with the elective nature of transformation to transprosthetic cannulation. In response to the question about the possibility of a perfect technique, we believe that only an accurate evaluation of the clinical setting leads to the most appropriate cannulation technique.

Silvia Mariani, MD
Giovanni Paolini, PhD
Francesco Formica, MD
Cardiac Surgery Clinic
Department of Surgery and Translational Medicine
University of Milano-Bicocca
San Gerardo Hospital
Monza, Italy

References

1. Demertzis S, Carrel T. Transformation of percutaneous venoarterial extracorporeal membrane oxygenation access to a safe peripheral arterial cannulation. *J Thorac Cardiovasc Surg*. 2013;146:1293-4.
2. Formica F, Avalli L, Colagrande L, Ferro O, Greco G, Maggioni E, et al. Extracorporeal membrane oxygenation to support adult patients. *Interact Cardiovasc Thorac Surg*. 2010;10:721-6.
3. Bisdas T, Beutel G, Warnecke G, Hoeper MM, Kuehn C, Haverich A, et al. Vascular complications in patients undergoing femoral cannulation for extracorporeal membrane oxygenation support. *Ann Thorac Surg*. 2011;92:626-31.
4. Huang SC, Yu HY, Ko WJ, Chen YS. Pressure criterion for placement of distal perfusion catheter to prevent limb ischemia during adult extracorporeal life support. *J Thorac Cardiovasc Surg*. 2004;128:776-7.
5. Demertzis S, Carrel T. Rapid peripheral arterial cannulation for extracorporeal life support with unimpaired distal perfusion. *J Thorac Cardiovasc Surg*. 2011;141:1080-1.

http://dx.doi.org/10.1016/j.jtcvs.2013.11.066

Reply to the Editor:

We thank Mariani and colleagues for their interest, and for their observations and remarks. Both reports that Mariani and colleagues refer to[1,2] are technical descriptions of surgical maneuvers conceived to deal with distinct clinical situations; they should not be perceived as clinical studies. Therefore, any comparison between them in terms of complications or outcomes would not be appropriate.

In the last report,[2] we suggest elective transformation of a percutaneous cannulation to a transprosthetic one as an alternative to a distal